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The Himalayas: would you rather climb them or model their hydrology?

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The Himalayas are the source of the major rivers of South Asia, acting as natural water reservoirs that store the largest volumes of ice and snow outside of the polar regions [1]. The water resources they produce are used by almost 750 million people [2], for irrigation [3] and hydropower production [4]. Hence, a robust spatio-temporal understanding of current and future water availability is necessary to inform adaptation planning that should support the regional economy and the livelihoods and well-being of inhabitants. However, high elevations, rugged terrain and complex interactions between orography and atmospheric circulation systems pose important modelling challenges, resulting in complex distributions of hydrological inputs and variables over multiple spatial scales [5]. The paucity of observational data due to the region's inaccessibility and high spatial variability leads to high uncertainty in model behaviour [6].

This PICO presentation describes the different strategies used in the UK-India collaborative project 'Sustaining Himalayan Water Resources in a Changing Climate' (SusHi-Wat) to cope with data scarcity in order to constrain uncertainty in the hydrological modelling outputs. They include:

• running nested high resolution numerical weather models to better represent topographical-driven processes;
• testing different bias-correction options for climate model outputs by running preliminary hydrological models,
• identifying dry and wet snow areas through data fusion of optical and radar remotely sensed data to constrain spatio-temporal timing of snow melt/accumulation;
• using models to infer glacier thickness from remote sensing-derived surface ice velocity fields; and
• utilising a multi-disciplinary team and the knowledge of key local stakeholders.

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